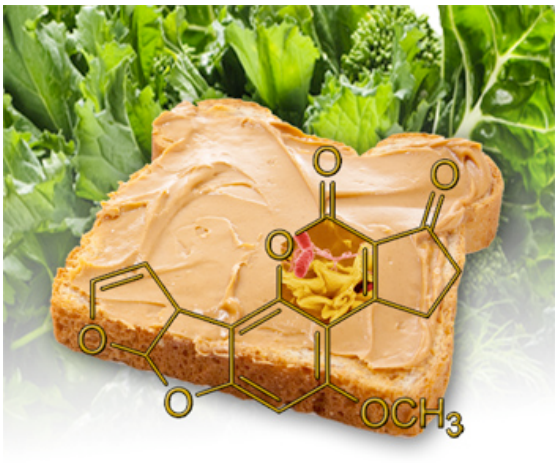
LAWRENCE LIVERMORE

REPORT

A weekly collection of scientific and technological achievements from Lawrence Livermore National Laboratory: Jan. 19-25, 2010

Don't forget to eat your greens



The age-old reminder to always eat your greens isn't just for kids anymore.

Not only are the vitamins and minerals good for you, but eating greens could also save your life, according to a recent study involving Laboratory scientists.

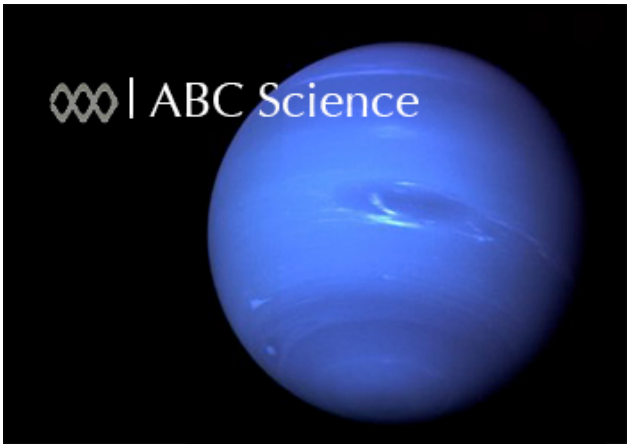
LLNL researchers Graham Bench and Ken Turteltaub found that giving someone a small dose of chlorophyll (Chla) or chlorophyllin (CHL) -- found in green leafy vegetables such as spinach, broccoli and kale -- could reverse the effects of aflatoxin poisoning.

Aflatoxin is a potent, naturally occurring carcinogenic mycotoxin that is associated with the growth of two types of mold: *Aspergillus flavus* and *Aspergillus parasiticus*. Food and food crops most prone to aflatoxin contamination include corn and corn products, cottonseed, peanuts and peanut products, tree nuts and milk.

Bench and Turteltaub, working with colleagues from Oregon State University and an industry partner, Cephalon Inc., found that greens have chemopreventive potential.

To read more, go to https://publicaffairs.llnl.gov/news/news_releases/2010/NR-10-01-03.html

Outer planets may have oceans of diamond



By melting and resolidifying diamond, scientists believe oceans of the precious gemstone exist in Neptune and Uranus. *(Source: NASA)*

Oceans of liquid diamond, filled with solid diamond icebergs, could be floating on Neptune and Uranus, according to a new report.

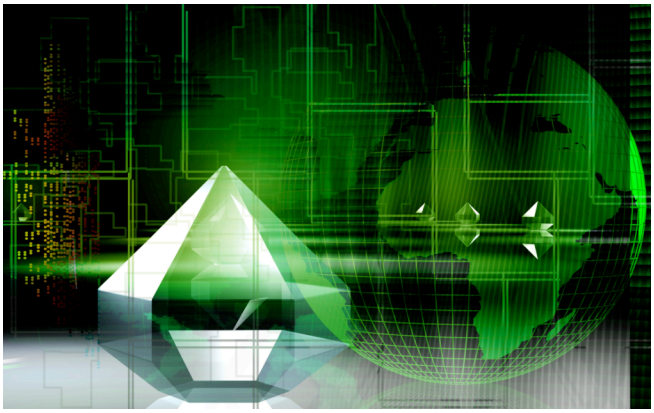
The research, published in *Nature Physics*, is based on the first detailed measurements of the melting point of diamond. It found diamond behaves like water during freezing and melting, with solid forms floating atop liquid forms.

The surprising revelation gives scientists a new understanding about diamonds and some of the most distant planets in our solar system.

"Diamond is a relatively common material on Earth, but its melting point has never been measured," said the Laboratory's Jon Eggert. "You can't just raise the temperature and have it melt; you have to also go to high pressures, which makes it very difficult to measure the temperature."

For more, go to http://www.abc.net.au/science/articles/2010/01/18/2794635.htm

Diamond is one tough cookie



Lab researchers have discovered new measurements using intense laser pulses, which show that diamond -- the strongest solid -- becomes even stronger during rapid compression, supporting almost a million times atmospheric pressure before being crushed.

Diamond has been characterized at high pressures and temperatures using shock waves generated by the intense laser pulses. Diamond is found to exhibit considerable strength right up to the point that it melts, at around six million atmospheres of pressure and 14,000 degrees Fahrenheit .

The research underscores the remarkable properties and technological utility of diamond: for example, as a capsule material for fusion-energy experiments at the National Ignition Facility, the world's largest laser. It also may provide insights into the ancient history of natural diamonds found on Earth and in meteorites, where shock waves caused by impact are common.

To read more, go to http://prb.aps.org/abstract/PRB/v81/i1/e014111

Two LLNL scientists garner DOE Early Career awards

Grigory Bronevetsky and Vsevolod Soukhanovskii

Grigory Bronevetsky of the Lab's Advanced Scientific Computing Research (ASCR) Program and Vsevolod Soukhanovskii of the LLNL's Fusion Energy Sciences program have both won a Department of Energy Early Career Research Program award.

Bronevetsky and Soukhanovskii are among 69 scientists nationwide that will receive five-year research grants funded under the American Recovery and Reinvestment Act. The program is designed to bolster the nation's scientific workforce by providing support to exceptional researchers during the crucial early career years, when many scientists do their most formative work.

Bronevetsky will focus his research on reliable high-performance peta-and-exa-scale computing, and Soukhanovskii will conduct research in the Advanced High Heat Flux Diverter Program on the National Spherical Torus Experiment. He is on a research assignment at Princeton Plasma Physics Laboratory.

Under the program, researchers based at DOE national laboratories will receive grants of at least $500,000 per year to cover year-round salary plus research expenses.

For more, go to http://www.energy.gov/news2009/8525.htm

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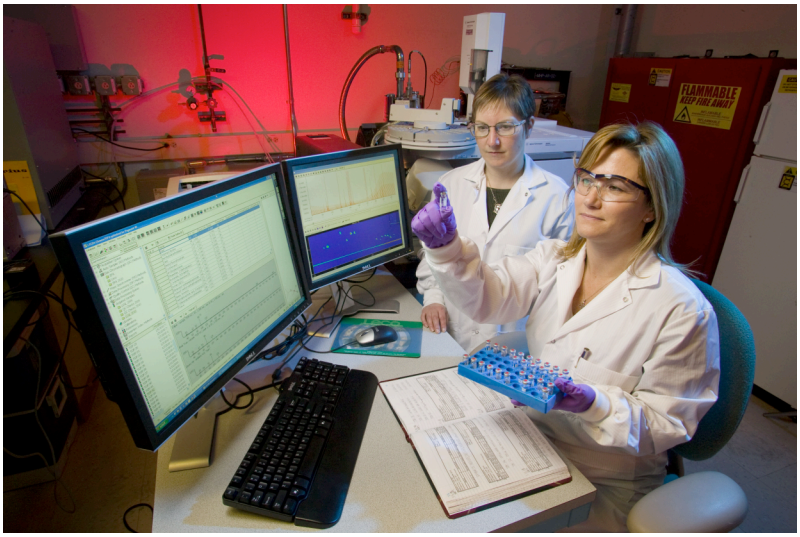
Photo of the week



Shake it up: Analytical chemists (left) Carolyn Koester and Heather Mulcahy work in one of the Laboratory's Forensic Science Center's (FSC) environmental reference laboratories where they develop and validate reliable, accurate and extremely sensitive methods to analyze chemical warfare agents and their degradation products.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

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The *Livermore Lab Report* archive is available at:
https://publicaffairs.llnl.gov/news/lab_report/2010index.html